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L-8

SPEED TIME DISTANCE - II

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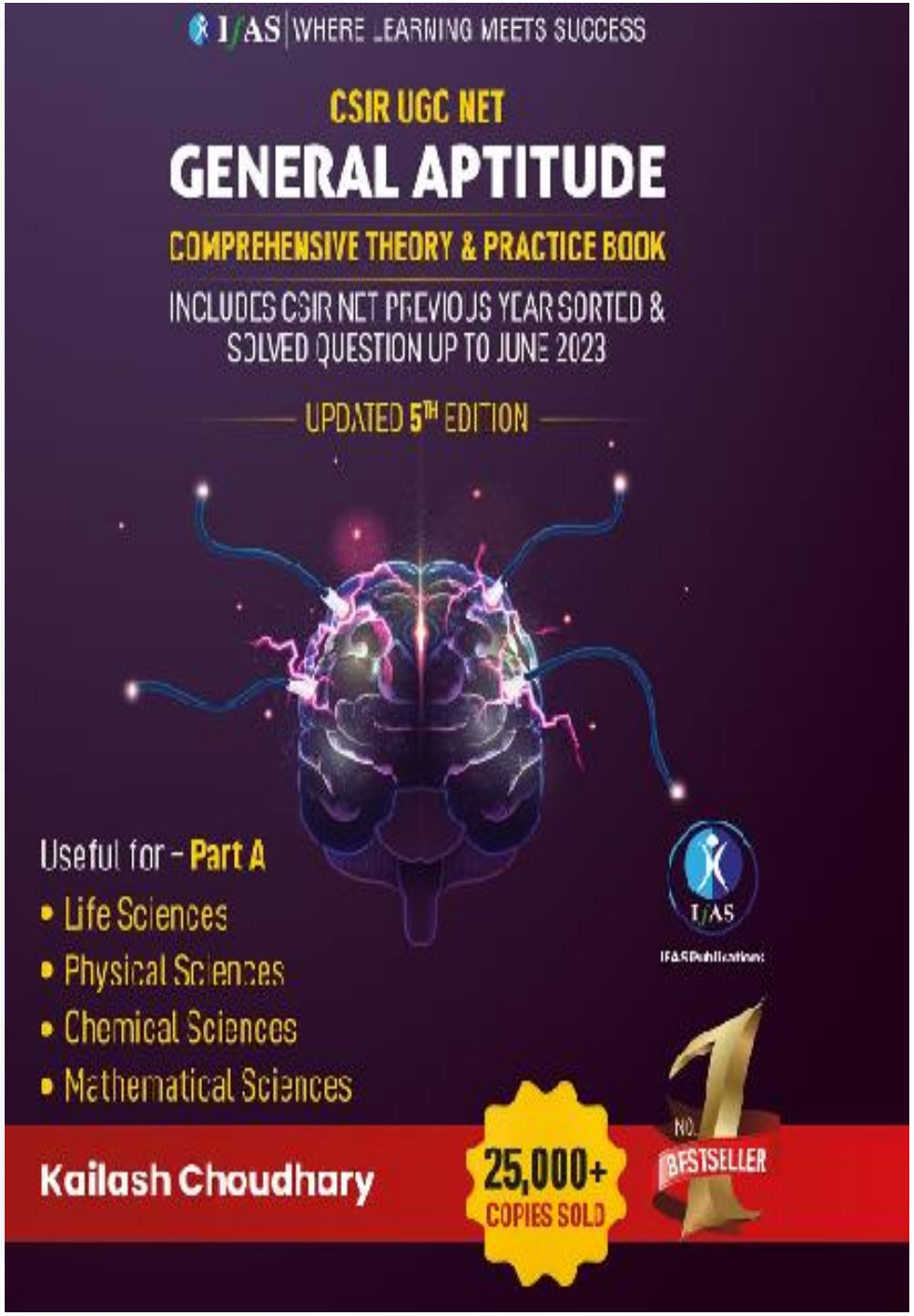
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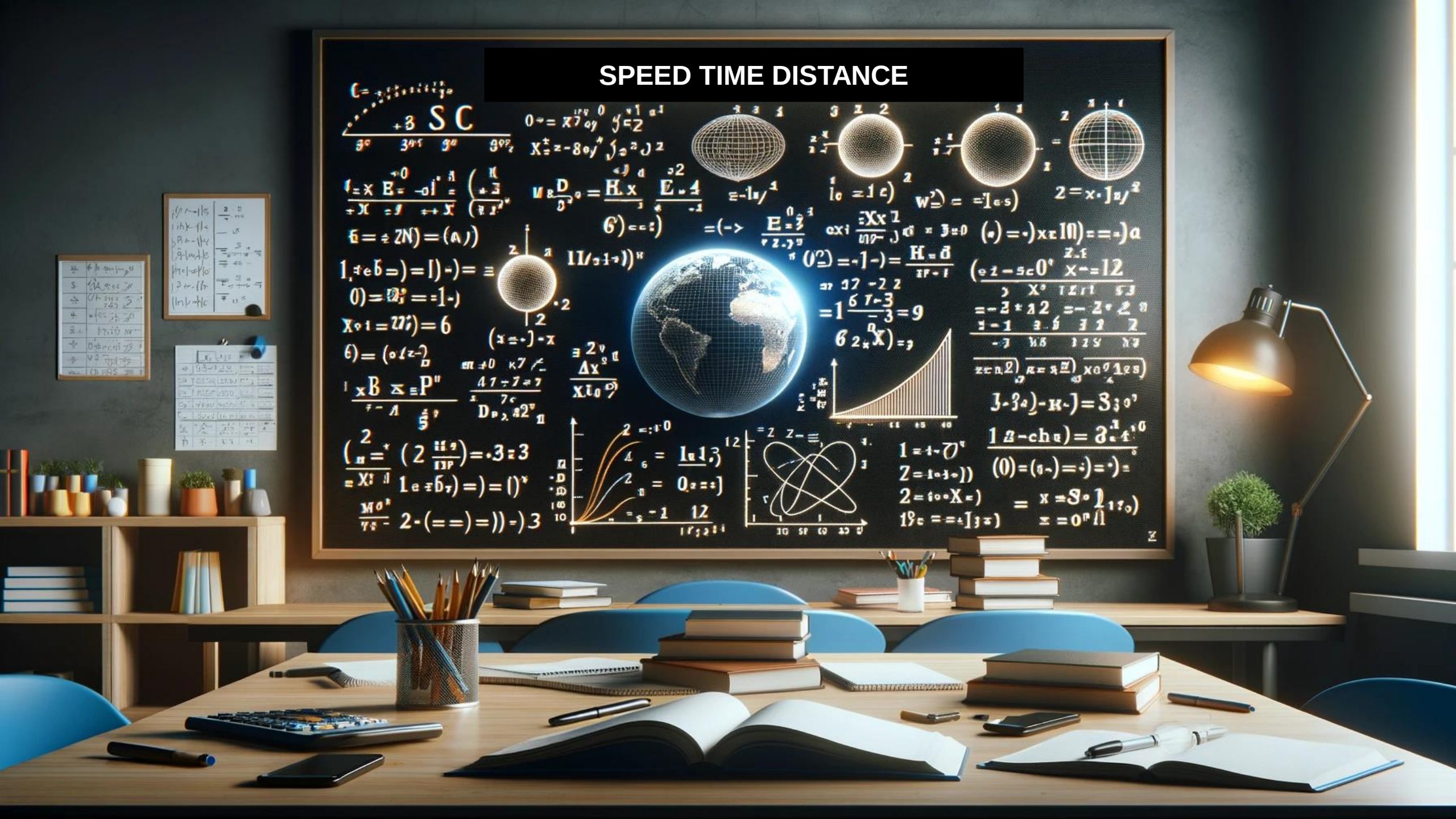
Topic Covered in Today's Session

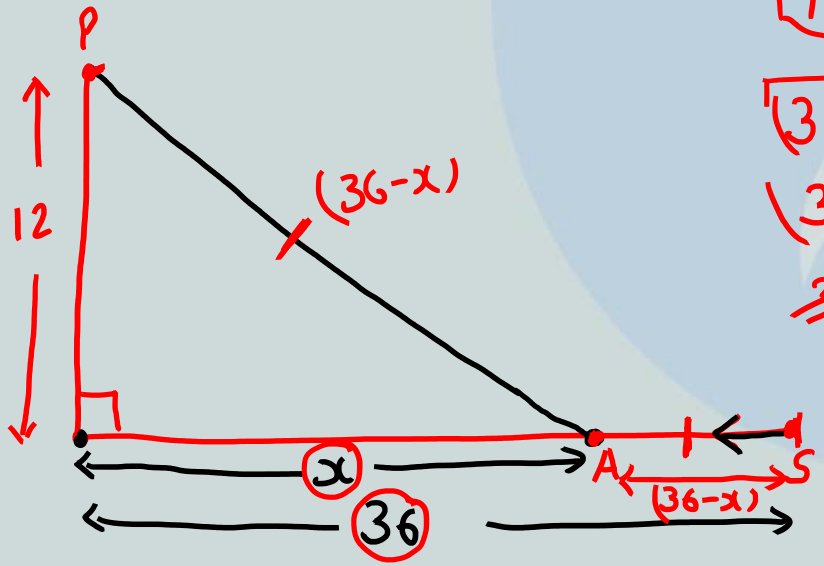
1. Practice questions
2. Boat and stream concept


SPEED TIME DISTANCE

Practice questions

Q1. A peacock perched on the top of a 12 m high tree spots a snake moving towards its hole at the base of the tree from a distance equal to thrice the height of the tree. The peacock flies towards the snake in a straight line and they both move at the same speed. At what distance from the base of the tree will the peacock catch the snake?

(1) 16 m Ans
(2) 14 m
(3) 18 m
(4) 12 m



$\Rightarrow$ PA = AS → Speed is equal and time is also equal

Pythagoras

$(36-x)^2 - x^2 = 12^2$

$(36-x+x)(36-x-x) = 144$

$\Rightarrow 36[36-2x] = 144$ ~~12~~ 4

$36-2x = 4$

$2x = 36-4$

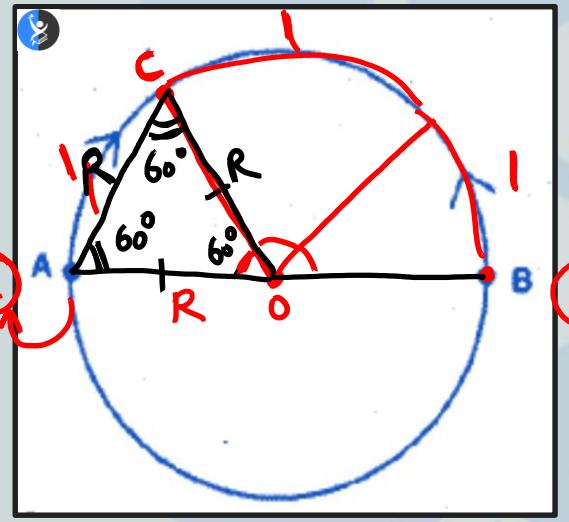
$x = \frac{32}{2} = 16\,m$

$a^2-b^2 = (a+b)(a-b)$

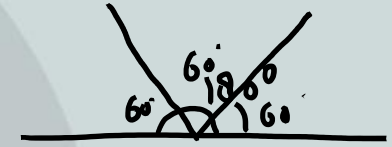
Q2. Two ants, initially at diametrically opposite points A and B on a circular ring of radius R, start crawling towards each other. The speed of the one at A is half of that of the one at B. The point at which they meet is at a straight line distance of :

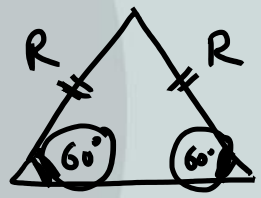
(1) R from A
(2) 3R/2 from A
(3) R from B
(4) 3R/2 from B

Ans



Δ AOC is equilateral Δ

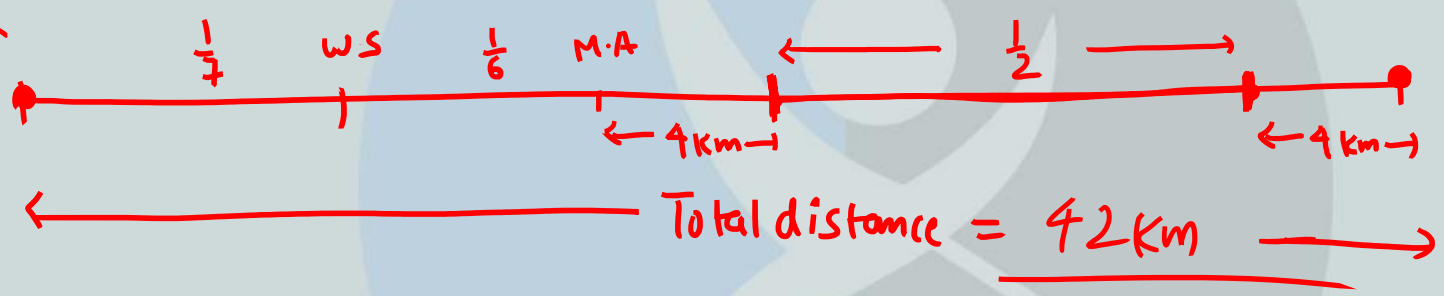




Q3. A long-distance runner finds a water station after completing 1/7th of the total distance. After covering another 1/6th of the total distance he gets medical-aid. Another runner joins him 4 km after the medical-aid station. The second runner stops 4 km before the completion of run, covering 1/2 of the total distance. What is the total distance?

(1) 21 km (2) 30 km (3) 42 km (4) 50 km

Ans



Q4. A tiger is 50 leaps of its own behind a deer. The tiger 5 leaps per minute to the deer is 4. If the tiger and the deer cover 8 meter and 5 meter per leap respectively, what distance in meters will the tiger have to run before it catches the deer?

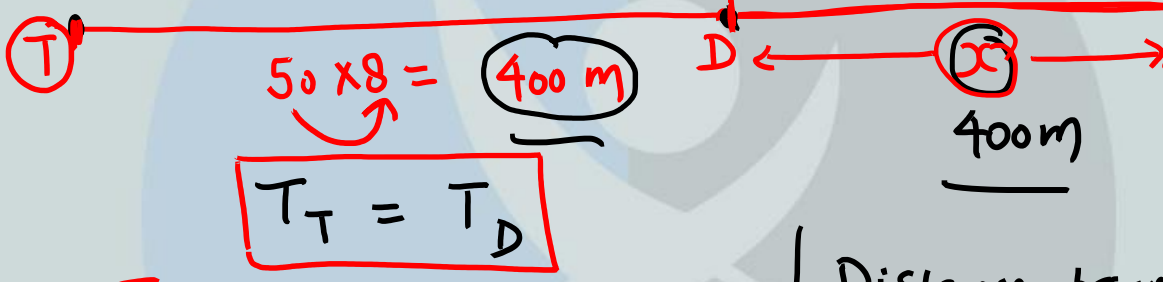
1) 200
2) 400
3) 600
4) 800

Jump

Speed)

Tiger = 5 × 8 = 40 m/min

Deer = 4 × 5 = 20 m/min



$50 \times 8 = 400$ m

$T_T = T_D$

$$\frac{(400+x)}{40_2} = \frac{x}{20}$$

$400 + x = 2x$

$x = 400$

Distance travelled by Tiger = 800 m

Q5. Two locomotives are running towards each other with speeds of 60 and 40 km/hr. An object keeps on flying to and fro from the front tip of one locomotive to the front tip of the other with a speed of 70 km/hr. After 30 minutes, the two locomotives collide and the object is crushed. What distance did the object cover before being crushed?

(1) 50 km
(2) 45 km
(3) 35 km
(4) 10 km

$$d = s \times t$$

$$d = 70 \times 0.5$$

$$d = 35 \text{ km}$$

Q6. There is a train of length 500 m, in which a man is standing at the rear end. At the instant the rear end crosses a stationary observer on a platform, the man starts walking from the rear to the front and the front to the rear of the train at constant speed of 3 km/hr. The speed of the train is 80 km/hr. The distance of the man from the observer at the end of 30 minutes is

(1) 41.5 km **(2) 40.5 km**
(3) 40.0 km **(4) 41 km**

Q7 .Walking at 4/5 of his normal speed, Dewang is 15 minutes late in reaching his club. What is the usual time (in hours) taken by him to cover the distance?

1. 2
2. 1
3. 2.5
4. 3

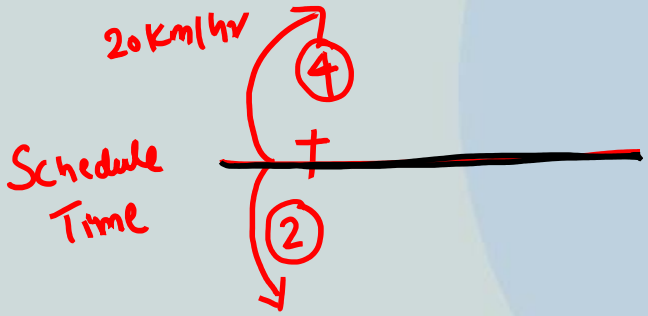
Q8. Kriplani goes to school at 20 km/hr and reaches the school 4 minutes late. Next time, she goes at 25 km/hr and reaches the school 2 minutes earlier than the scheduled time. What is the distance (in km) of her school ?

1. 20
2. 10
3. 15
4. 25

$$d = \frac{x \cdot y}{(x-y)} \times \frac{\Delta t}{60}$$ → 6 min

$x = 25$

$y = 20$



$$d = \frac{25 \times 2\cancel{0}}{(25-20)} \times \frac{\cancel{6}}{\cancel{60}_{1\cancel{0}}}$$

$$d = \frac{5\cancel{0}}{\cancel{5}} = 10 \text{ km}$$

Q9. A man travels from his home to office at 4km/hr and reaches his office 20 min late. If the Speed had been 6 km/hr he would have reached 10 min early. Find the distance from his home to office.

1. 8 km
2. 12 km
3. 6 km
4. 9 km

$$d = \frac{x \cdot y}{x - y} \times \frac{\Delta t}{60} = \frac{6 \times 4}{(6-4)} \times \frac{30}{60} = 2$$

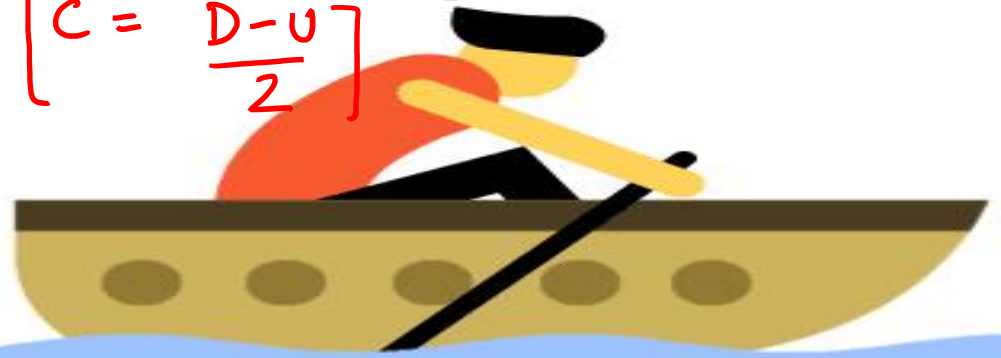
$$\frac{6 \times 2}{2} = 6\,km$$

Boat and stream concept

1. **Downstream** $D \Rightarrow$ Boat and water are in same direction $(\rightrightarrows)$ $D = (B + C)$
2. **Upstream** $U \Rightarrow$ Boat and water are in opposite direction. $(\rightleftarrows)$ $U = (B - C)$

$B > C$

3. B = Speed of boat in still water $\left[B = \frac{D+U}{2}\right]$
4. C = Speed of water / current $\left[C = \frac{D-U}{2}\right]$



Q1. A man rows a boat 18 kilometres in 4 hours downstream and returns upstream in 12 hours. The speed of the stream (in km per hour) is:

(a) 1
(b) 1.5
(c) 2
(d) 1.75

$$D = \frac{18}{4_2}^{9} = 4.5$$

$$U = \frac{18}{12_2}^{3} = 1.5$$

$$C = \frac{D-U}{2} = \frac{4.5-1.5}{2}$$

$$C = \frac{3}{2} = 1.5 \text{ km/hr}$$

Q2. A boat running downstream covers a distance of 20 km in 2 hrs while it covers the same distance upstream in 5 hrs. Then speed of the boat in still water is

(a) 7 km/hr
(b) 8 km/hr
(c) 9 km/hr
(d) 10 km/hr

$D = \frac{20}{2} = 10 \text{ km/hr}$ $U = \frac{20}{5} = 4 \text{ km/hr}$

$B = \frac{D+U}{2} = \frac{10+4}{2} = \frac{14}{2} = 7 \text{ km/hr}$

Q3. A boy can swim in still water at a speed of 10 km/hr. If the speed of the current would have been 5 kmph, then the boy could swim 60 km

P49

(a) upstream in 4 hour
(b) downstream in 12 hours
(c) upstream in 6 hours
(d) downstream in 4 hours

$B = 10$ km/hr
$C = 5$ kmph

$D = B + C$
$D = 10 + 5$
$D = 15$
$t = \frac{60}{15} = 4$ hrs

$U = B - C$
$U = 10 - 5$
$U = 5$
$t = \frac{60}{5} = 12$ hrs

Q4. The speed of the current is 5 km/hour. A motorboat goes 10 km upstream and back again to the starting point in 50 minutes. The speed (in km/hour) of the motorboat in still water is

(a) 20 ✗
(b) 26
(c) 25 ✓
(d) 28

$\frac{10^2}{15} + \frac{10^2}{25}$ (3, 5)

$\frac{10+6}{15} = \frac{16}{15} =$

10km ← (B+C) Down

A (B−C) 10km UP → B

$T_{AB} + T_{BA} = \frac{50}{60}$

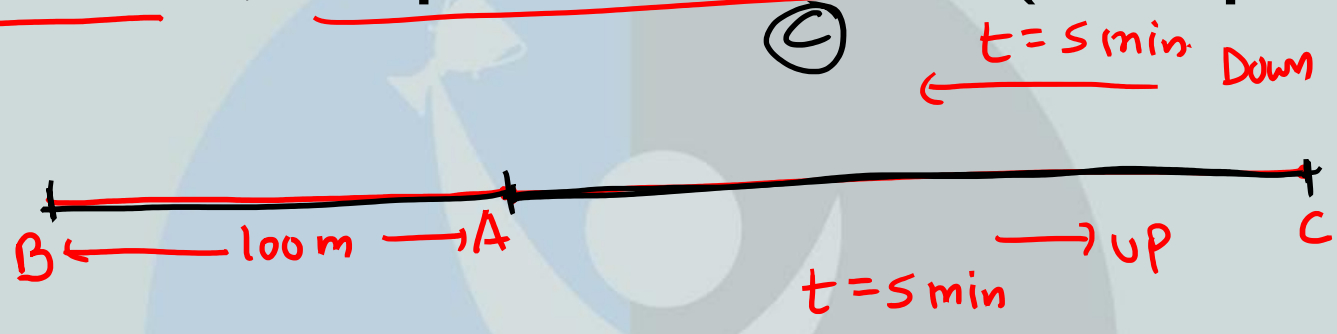
$\frac{10}{B-5} + \frac{10}{B+5} = \frac{5}{6}$

$\frac{10^2}{20} + \frac{10^2}{30}$ (4, 6)

$\frac{6+4}{12} = \frac{10}{12} = \frac{5}{6}$

Q5. A swimmer swims from a point A against a current for 5 minutes and then swims backwards in favour of the current for next 5 minutes and comes to the point B. If AB is 100 meters, the speed of the current (in km per hour) is:

(a) 0.4
(b) 0.2
(c) 1
(d) 0.6



$$D_D - D_U = 100 - 100$$

$$(B+C)\frac{5}{60} - (B-C)\frac{5}{60} = \frac{1}{10}$$

$$\frac{5}{60}\left[(B+C)-(B-C)\right] = \frac{1}{10}$$

$$B+C-B+C = \frac{6}{5}$$

$$2C = 1.2$$

$$C = \frac{1.2}{2}$$

$$C = 0.6 \text{ km/hr}$$

Q6. The speed of boat in still water is 5 km/hr more than speed of current and the ratio of speed of boat in downstream to the speed of boat in still water is 4 : 3. Find downstream distance covered by boat in 3 hours.

(a) 33 km
(b) 30 km
(c) 36 km
(d) 39 km

Q7. A boat goes 6 km an hour in still water, but takes thrice as much time in going the same distance against the current. The speed of the current (in km/hour) is:

(a) 4
(b) 5
(c) 3
(d) 2

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